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From: "Lynn D. Yarbrough" <73053.2454@compuserve.com>
To: "Secretary, FTC" <y2k@ftc.gov>
Date: 6/1/98 1:54am
Subject: Response to call for comment on Y2K

Dear Secretary:

Attached is a MS Works document in response to your office's request for comment on the Y2K problem and how it affects businesses. If you cannot read this attachment, please advise and I will resubmit as ASCII text.

I appreciate the opportunity to be heard on this issue, as I am deeply concerned about Y2K.

Sincerely yours,

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Office of the Secretary
Federal Trade Commision
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Secretary:

The Federal Trade Commision "seeks comment on what types of computer software and electronic products are likely to experience Y2K problems" and how various businesses will be affected by Y2K. This memorandum is sent in response to the FTC's request. Thank you for the opportunity to be heard on Y2K issues.

I am a Computer Scientist, an independent Consultant with over 40 years' experience in Software Development, Computer Sales, Operations, and Research in Aerospace, University, Product Planning and Management, and various other duties.

I first encountered the problems associated with Y2K in 1962. The experience was enlightening and came about in this way: I had developed, for a major Aerospace company, a computer program for Long Range Planning. The program was quite successful and was accepted by the customers in Feb 1962 and regularly used by them until 1 Oct 1962, when it suddenly began producing outrageous results, including projections of negative business volume and other absurd data, rendering the program useless and forcing its users to revert to manual methods that had been largely forgotten. The users reacted with anger and frustration, and I was pulled away from other work to repair the program.

It took some study to find the problem: I had misallocated storage so that the first digit of the current month was being erased due to overlapping data fields, so October results were computed based on month 00 instead of 10. My analysis of this program bug gave insight into the current Y2K problem: the causes of the two problems are essentially the same, and the effects are different only in the specific values of the wrong numbers produced.

All computing is centered on numbers and arithmetic. Many numbers only make sense if they are *positive* numbers: the number of people in your household, your height and weight, the distance you travel to work, the time duration of your favorite TV program. Negative numbers don't make sense for them. In particular, *time intervals are always positive.* The Elapsed Time (ET) to accomplish anything is always positive. An ET for any action is calculated by subtracting the time the action starts from the time the action is complete.

It is possible, although incorrect, for a number interpreted as an ET to be negative inside a computer. It gets that way if for any reason the end time for an action is less than the start time. To be specific, that happens if the end time is misrepresented by a year of 00 while the start time has a year of 99 or less. This negative ET I describe as 'toxic' in that it contaminates anything it contributes to within the computer. Any

calculation that uses a toxic number produces a toxic result and the effect spreads; before long the computer is filled with toxic data.
The errors produced by toxic ET data are frequently extreme: if an ET is expected to be, say, 20 seconds, the results based on the 1999-1900 rollover on that data will be multiplied by a factor of -157,788,000, the number of 20-second intervals in -100 years.

Toxic ET data can appear in a computer not only by a user entering dates, but also directly from its own internal calendar. This is a very serious problem for the majority of computer systems; they can generate toxic data all by themselves without any help from outside.

ET data is used in the vast majority of Commercial applications, including Payroll, Accounts payable and receivable, any calculations based on Interest, Tax computation, indeed any operation based on data records that are time/date stamped for future processing. Of course, any program that depends on toxic ET data can be expected to fail on 1/1/2000, if not before. For this reason, all commercial enterprises and government agencies whose operations depend on computers are affected and at risk of losing their capability of managing their operations. Not only are individual enterprises at risk, but the vast interrelated network of suppliers of goods and services is at risk of collapse.

Many commercial enterprises and government agencies depend on communication with others for transmission of orders, payments, verifications, and other transactions that are ET-related. Banks use very precise timing of their transactions to prevent counterfeiting of electronic messages. Since data transmission depends on complex and precisely timed electronic switching, all commercial electronic data operations are at risk. Not only US banks but the world banking system as a whole is at risk. The IRS is an outstanding example of an agency which is central to the functions of government and is also at risk. The stock markets and their constituent interrelated enterprises form a network of high-risk elements that is central to the economic soundness of the nation.

The operations of public utilities (power, water, natural gas, heating oil) and related systems (waste water, steam, chemicals) are regulated by embedded processors that are both ubiquitous and frequently extremely difficult to identify, test, and replace/repair. Therefore the Y2K problem puts the entire infrastructure of public utilities at risk. Since everything else depends on electric power, that industry is central to the survival of our industrial society.

Health services (Hospitals, ambulances, pharmacies, etc.) are put at risk by Y2K. Any medical instrument which contains a microprocessor monitor or control function may be ET-toxic and place patients at life-threatening risk. Pharmacies may find that date conflicts may trigger the rejection of new supplies in favor of retaining older, obsolete products. Ambulances that use GPS receivers to help locate injured people may be misdirected.